

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

TCP2201 – OBJECT ORIENTED ANALYSIS AND DESIGN
(All sections / Groups)

8 MARCH 2019
9:00 A.M – 11:00 A.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 6 pages with 4 questions only
2. Answer **ALL QUESTIONS**
3. All questions carry equal marks (25 marks) and the distribution of the marks for each sub-question is given
4. Write your answers in the answer booklet provided

Question 1

Given this code:

```
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;

public class mainPanel extends JFrame implements ActionListener
{
    private JButton dataButton;
    private JButton ChoiceButton;
    private JButton processButton;
    public int ProcessType=1;
    public data Data;

    public mainPanel()
    {
        super("Main Control Panel");
        JPanel jp=new JPanel(new FlowLayout());
        add(jp);
        setSize(320,150);
        dataButton = new JButton("Load Data");
        ChoiceButton = new JButton("choose Process");
        processButton = new JButton("Process");
        dataButton.addActionListener(this);
        ChoiceButton.addActionListener(this);
        processButton.addActionListener(this);
        jp.add(dataButton);
        jp.add(ChoiceButton);
        jp.add(processButton);
        setVisible(true);
    }

    public void actionPerformed(ActionEvent e)
    {
        if (e.getSource() == dataButton)
            Data = new data();
        else if (e.getSource() == ChoiceButton)
            Data.choose(this); // Will update the process type
                               // based on the user's choice
        else if (e.getSource() == processButton)
            Data.Process(this); // Will use the process type specified
                               // by the Choice button
    }
}
```

- a) There are 6 violations of the Java Naming Convention in this code. List them and what the correction would be. [6 marks]
- b) What does violation of encapsulation mean? What are the cases of violation of encapsulation in this code? [4 marks]
- c) This code contains an example of a bad practice that should have been solved with polymorphism. Where in the code was this bad practice implemented? Why is this practice bad? [6 marks]

Continued...

- d) Give the full list of things that need to be changed in order to fix the problem pointed out in part c. You may give this as an updated Java code showing all the changes, or detail the things that need to be changed in English (but if you use English, you must be clear exactly what needs to be changed.) [9 marks]

Continued...

Question 2

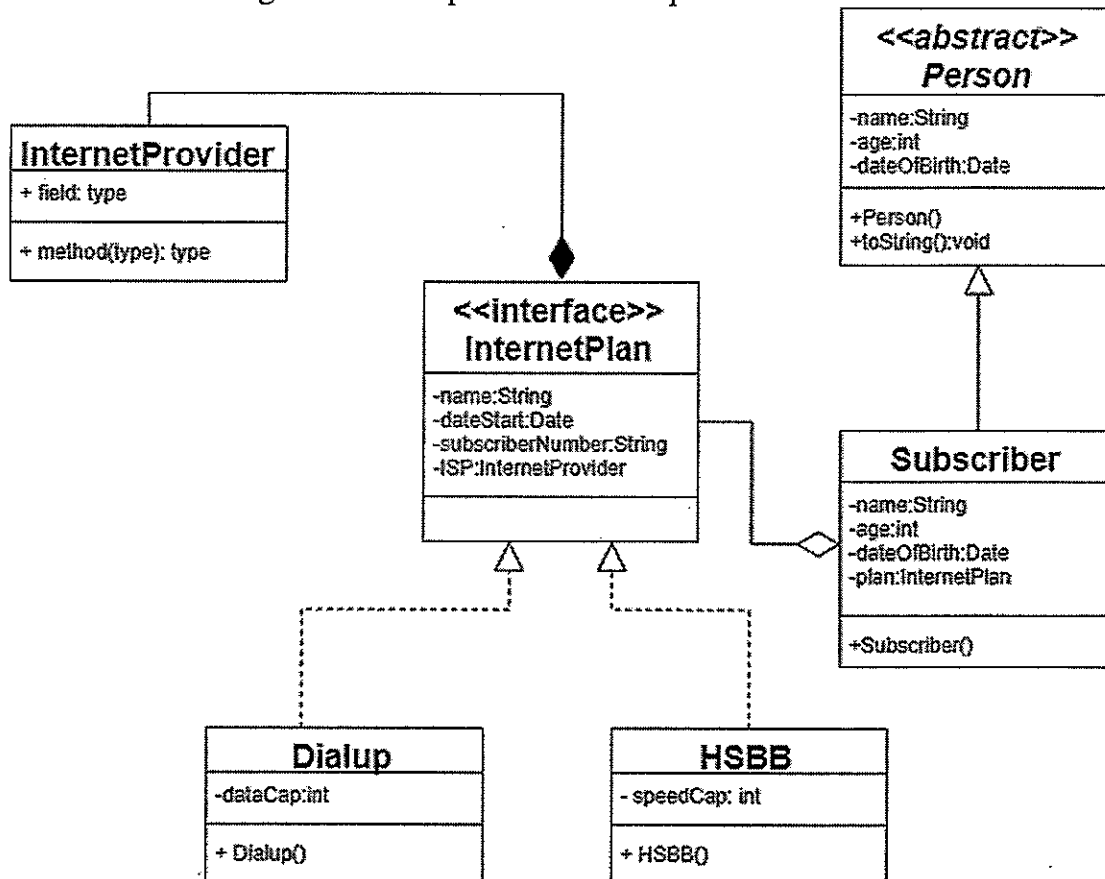
- a) Software projects can generally be categorised into 4 general types. Briefly describe these types and the work involved in each. [4 marks]
- b) What are the three (3) components in a UML sequence diagram and how are they represented in the diagram? [6 marks]
- c) Draw the sequence diagram to show the interaction between the objects in this restaurant scenario: [6 marks]
- A customer makes an order with the waiter
 - The waiter queues customers' food orders to the kitchen cook
 - The cook confirms the order and the waiter serves the customer their drinks
 - The cook notifies the waiter once the customer's order is ready
 - The waiter serves the customer's food order
 - The customer consumes their food
 - When complete, the customer proceeds to pay the order at the cashier
- d) Convert the sequence diagram drawn in (c) into its equivalent collaboration diagram [5 marks]
- e) The following code excerpt for a parent class is said to not fully support the interface segregation principle (ISP) of object-oriented design. Explain what ISP is and where in the code this violation occurs and its implications on programming. [4 marks]

```
public class Animal {  
    String species;  
    Boolean gender;  
    public abstract void walk();  
    public abstract void fly();  
}
```

Continued...

Question 3

The UML class diagram below is provided for the questions that follow.



- UML components are categorised into structural, behavioural, grouping and annotational 'things'. Describe the two (2) elements that can be found in the behavioural things category and show notation symbol(s) used for the chosen element. [4 marks]
- Describe the similarities and differences between composition and aggregation relationships between objects. What notation is used to represent these relationships in a UML diagram? [6 marks]
- Which class object(s) in the UML diagram above show a composition relationship? [1 mark]
- Which class object(s) in the UML diagram above show an aggregational relationship? [1 mark]
- From the class objects identified in (c) and (d), convert the classes into Java code. You do not need to write in the method bodies (only the header/prototype) and you do not need to write the code for any other classes used. [13 mark]

Continued...

Question 4

- a) Please state what category these design patterns are in, and explain what each one means.
- Observer
 - Bridge
 - Singleton
- [9 marks]

- b) The automotive company you work for uses the Gowin management system to manage its process flow. Recently, a new system called Pinax had been purchased to manage the new self-driving module for the latest cars.

Unfortunately, it turns out that Pinax uses a different API from what Gowin uses. What design pattern should be used so that the different APIs of Pinax and Gowin will be able to work together?

What design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

[6 marks]

Warning: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked.

- c) You are creating the BBN subsystem that will be used by many different programmers outside of your team. It has many complex parts, which means that those outside programmers might get confused if you give them the entire interface as-is.

What design pattern would you use for this scenario? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to.

[6 marks]

Warning: No marks will be given if you do not explain why you chose this design pattern. If there is more than one possible design pattern, you must only choose one, and your explanation will partially determine if your choice is reasonable or not. If you name more than one, only the first one will be marked.

- d) When is the MVC useful? Why is it useful?
- [4 marks]

End of paper

